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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,560	05/20/2005	Gebhard Zobl	SB-514	4363

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EXAMINER	
KEMMERLE III, RUSSELL J	

ART UNIT	PAPER NUMBER
1791	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/533,560	ZOBL ET AL.	
	Examiner	Art Unit	
	RUSSELL J. KEMMERLE III	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2008 and 07 August 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8-12,14 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-12,14 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Responsive to the Order Returning Undocketed Appeal to the Examiner dated 12/3/08 the following is considered:

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7 August 2008 has been entered.

Claim Objections

Claim 8 is objected to because of the following informalities:

Claim 8 appears to contain a typo where the angle of inclination of the side surfaces after both the first and second pressing operations is identified as α'. It appears based on claim 11 that the angle after the first pressing should be α' and the angle after the second pressing should be α.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

Claims 8-12, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida (US Patent 6,660,420) in view of Koga (US Patent 6,517,338) and Quadakkers (US Patent 5,733,682).

Yoshida discloses a method for forming a separator (i.e., an interconnector) for a fuel cell comprising a two step pressing operation. The process includes pressing the powder to a shape similar to a final desired shape to create a preliminary molded member, then further pressing the preliminary molded member to create a molding of the final desired shape (Col 4 lines 12-16). The separator is generally plate-like with a plurality of knob like protrusions (See Fig. 1). While the angle of inclination is not specifically given, it appears from the drawings to be approximately 90° (see Figs. 3, 4B and 6). Yoshida further discloses that the dimensions of the preliminary molded member in the direction of the molding pressure (i.e., the height of the knobs) are about 1 to 2 times the dimensions of the final molded member.

Yoshida does not disclose that in the second pressing steps the angle of inclination is increased to between 95° and 170°.

Koga teaches a method of pressing a powder into a desired shape using a set of molding dies to create a fuel cell separator having a number of protrusions extending from the base plate of the separator. Koga discloses that the dies include holes used to form the protrusions which could have an inside wall that is not perpendicular to the other surface, but is instead inclined at a given angle so that the diameter of a protrusion would decrease as it moved away from the base plate (Col 5 lines 7-21).

The angle of inclination formed between the base plate and the protrusion is stated as preferably being between 91° and 100° (Col 5 lines 14-15), and appears to be approximately 105° in Fig. 6, however Koga further notes that inclined walls of the die need only to have a inclined (i.e., not perpendicular) inside wall, and that any inclination or shape (i.e., the walls do not need to be linear) would work (Col 5 lines 18-21).

Yoshida and Koga do not disclose that the powder used be selected from the group consisting of metallic and ceramic materials, and specifically be an alloy having at least 20 wt% of chromium (Cr) component (claim 13), or that the alloy contain Cr, iron (Fe) and one or more metallic or ceramic alloy of at most 40 wt%.

Quadakkers discloses a bipolar plate (i.e., interconnector or separator) for a fuel cell and a metal and ceramic composition of the same which must be sintered to obtain the final product. One composition specifically disclosed by Quadakkers include (all percentages given are based on weight) 20% Cr, 5% aluminum (Al), 0.5% Yttrium Oxide (Y_2O_3), balance (74,5%) Fe, this composition is said to have superior corrosion resistance (Col 2 lines 1-3, 13-14, see also claim 6).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method of forming a fuel cell separator by a two step pressing process as taught by Yoshida with the second pressing step reducing oversized knobs down to a final desired size with the fuel cell separator pressing process taught by Koga where the angle of inclination between the base plate and the knob-like protrusion is greater than 90° during the pressing step reducing the powder to

a near net final shape, since Koga discloses that having such an angle makes it easier to release the pressed piece from the die (Col 5 lines 20-21).

It would have been further obvious to one of ordinary skill in the art at the time of invention by applicant to use the composition taught by Quadakkers and discussed above in the process of Yoshinda and Koga since Quadakkers discloses that such a composition is effective as a fuel cell separator and creates a separator with increased corrosion resistance. One would have been motivated to do so since all three references are directed toward an interconnector of a fuel cell, and Yoshida and Koga discuss the advantages of using near final shape press molding to create the interconnector, while Quadakkers discloses the advantages of using the material discussed above in creating such an interconnector.

Referring to claim 11, Yoshida and Koga do not specifically disclose that the angle of inclination between the base plate and the knob-protrusions after the first pressing be between 110° and 130°, and be increased by the second pressing to between 115° and 160°. However, it would have been obvious to one of ordinary skill in the art at the time of invention by applicant that the angle of inclination taught by Koga, as discussed above, could include angles in both of those ranges. It would have been obvious that the angle of inclination should be greater than 90° during both the first and second pressing operations in order to obtain the benefit disclosed by Koga of allowing for easier release from the molds. It would have been further obvious that the angle be increased in the second pressing step since that would be the most obvious method of ensuring that the protrusion was uniformly subjected to the pressing force of the second

step to result in a further pressed piece as taught by Yoshida, while still allowing for the increased ease of removal as taught by Koga.

Referring to claim 12, Yoshida and Koga do not specifically disclose a pre-sintering step after the first pressing stage. It is well known in the art that when a powder is pressed which include known additives to assist in forming the mold (such as a binder or lubricant), that these materials should be burned off prior to sintering by heating the molding to a at temperature which those additives volatilize and are thus removed from the molded piece. It would have been obvious to one of ordinary skill in the art at the time of invention by applicant that when a powder which uses additives is used to form the molding, that a pre-sintering step be used to remove those additives after the piece is molded and before the piece is finally sintered.

Referring to claim 15, Yoshida, Koga and Quadakkers are relied upon as discussed above, further they all discus where the molding produced is an interconnector or separator for a fuel cell.

Response to Arguments

Applicant's arguments filed 07 August 2008 (including the declaration under 37 C.F.R. §1.132 by Dr. Lorenz S. Sigi, "the Sigi declaration") have been fully considered but they are not persuasive.

The declaration under 37 CFR 1.132 filed 07 August 2008 is insufficient to overcome the rejection of claims 8-12, 14 and 15 based upon Yoshida in view of Koga and Quadakkers applied under 35 U.S.C. §103 as set forth in the last Office action because the declaration relies largely upon opinion instead of facts, and any facts

presented have not been shown to be commensurate in scope with the current claims or to compare the current claims to the closest prior art.

The Sigi declaration states that it is Dr. Sigi's opinion that those skilled in the art had available to them for near-final shape processing of chromium containing alloys MIM and WPP. However it is not explained why these would be the only two processes available for such shaping. Quadakkers discloses that near-net shaping can be done by powder metallurgical methods, of which pressing is one. While MIM and WPP are the only specific examples disclosed by Quadakkers, there does not appear to be any reason on the record why one skilled in the art would not look to other powder metallurgical methods.

The Sigi declaration also states that graphite powders and Cr-powders behave entirely differently in the context of press compaction, and therefor one skilled in the art would not think to use a forming process for one on the other. However, there has been no evidence supplied to show this difference or why it would lead one to believe that the forming methods were not compatible.

The Sigi declaration finally discusses other sintered iron-based Cr-containing metals (stainless steels) and how the porosity of these materials makes them unsuitable for use as a fuel cell interconnector unless the Cr content is no more than 0.25 mass%. It is not clear however that this is comparable to the closest prior art. While the present invention, the material of Quadakkers and the stainless steel discussed in the Sigi declaration all contain Fe and Cr, it is not clear that the stainless steel is comparable in other respects to the material of Quadakkers. The porosity discussed as being

unacceptable by Dr. Sigi could be affected by many factors including the remaining composition of the metal, any additives used, or the forming method, none of which are discussed.

In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

Applicants further argue that none of the prior art that would suggest a two stage pressing operation where two different angles of inclination are used for each step.

This is not found to be persuasive because, as discussed above, Yoshida discloses a two step pressing operation, and that one of ordinary skill in the art would have found it obvious to modify this by using the increased inclination angle as taught by Koga to allow for easier release of the molded body during all stages of processing. It would have been further obvious that the angle be increased in the second pressing step since that would be the most obvious method of ensuring that the protrusion was uniformly subjected to the pressing force of the second step to result in a further pressed piece as taught by Yoshida, while still allowing for the increased ease of removal as taught by Koga

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RUSSELL J. KEMMERLE III whose telephone number is (571)272-6509. The examiner can normally be reached on Monday through Thursday, 7:00-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Steven P. Griffin/
Supervisory Patent Examiner, Art Unit 1791

/R. J. K./
Examiner, Art Unit 1791